Amendment to the claims

Cancel claims 5, 11 and 19.

Add new claims 24, 25 and 26.

1. (Currently Amended) A magnetic head assembly, that has a head surface for facing a magnetic medium, comprising:

a read head that includes a sensor;

the sensor including:

an antiparallel (AP) pinned layer structure;

a ferromagnetic free layer structure having a magnetic moment that is free to rotate in response to a field signal; and

a spacer layer located between the free layer structure and the AP pinned layer structure;

the antiparallel (AP) pinned layer structure including:

ferromagnetic first and second antiparallel (AP) pinned layers;

an antiparallel coupling (APC) layer located between and interfacing the first and second AP pinned layers;

the first and second AP pinned layers self pinning one another without assistance of an antiferromagnetic (AFM) pinning layer;

the second AP pinned layer being located between the first AP pinned layer and the spacer layer; and

the first AP pinned layer being composed of cobalt platinum chromium[[.]] $Co_{82}Pt_{10}Cr_{8}$.

2. (Original) A magnetic head assembly as claimed in claim 1 including:

nonmagnetic electrically nonconductive first and second read gap layers;

the sensor being located between the first and second read gap layers;

ferromagnetic first and second shield layers; and

the first and second read gap layers being located between the first and second shield layers.

3. (Original) A magnetic head assembly as claimed in claim 2 further comprising:

a write head including:

ferromagnetic first and second pole piece layers that have a yoke portion located between a pole tip portion and a back gap portion;

a nonmagnetic write gap layer located between the pole tip portions of the first and second pole piece layers;

an insulation stack with at least one coil layer embedded therein located between the yoke portions of the first and second pole piece layers; and

the first and second pole piece layers being connected at their back gap portions.

4. (Currently Amended) A magnetic head assembly as claimed in claim 2 wherein the free layer structure is located between the AP pinned layer structure and [[the]] a first pole piece layer.

5. (Canceled)

6. (Currently Amended) A magnetic head assembly as claimed in claim [[5]] 4 wherein the second AP pinned layer is composed of cobalt iron (CoFe).

7. (Original) A magnetic head assembly as claimed in claim 6 further comprising:

a seed layer structure located between the first read gap layer and the AP pinned layer structure; and

the seed layer structure including:

a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

the first seed layer being located between the first read gap layer and the second seed layer.

8. (Original) A magnetic head assembly as claimed in claim 7 wherein the free layer structure includes a first free layer composed of cobalt iron (CoFe) and a second free layer composed of nickel iron (NiFe) with the first free layer being located between the spacer layer and the second free layer.

9. (Original) A magnetic head assembly as claimed in claim 8 wherein the spacer layer is copper (Cu).

10. (Currently Amended) A magnetic disk drive including at least one magnetic head assembly that has a head surface for facing a magnetic medium and that includes a write head and a read head, comprising:

the write head including:

ferromagnetic first and second pole piece layers that have a yoke portion located between a pole tip portion and a back gap portion;

a nonmagnetic write gap layer located between the pole tip portions of the first and second pole piece layers;

an insulation stack with at least one coil layer embedded therein located between the yoke portions of the first and second pole piece layers; and

the first and second pole piece layers being connected at their back gap portions;

the read head including:

nonmagnetic electrically nonconductive first and second read gap layers;

a sensor located between the first and second read gap layers;

ferromagnetic first and second shield layers; and

the first and second read gap layers being located between the first and second shield layers;

the sensor including:

an antiparallel (AP) pinned layer structure;

a ferromagnetic free layer structure having a magnetic moment that is free to rotate in response to a field signal; and

a spacer layer located between the free layer structure and the AP pinned layer structure;

the antiparallel (AP) pinned layer structure including:

ferromagnetic first and second antiparallel (AP) pinned layers;

an antiparallel coupling (APC) layer located between and interfacing the first and second AP pinned layers;

the first and second AP pinned layers self pinning one another without assistance of an antiferromagnetic (AFM) pinning layer;

the second AP pinned layer being located between the first AP pinned layer and the spacer layer; and

the first AP pinned layer being composed of cobalt platinum chromium[[;]] $\underline{Co_{82}Pt_{10}Cr_{8}}$;

a housing;

the magnetic medium being supported in the housing;

a support mounted in the housing for supporting the magnetic head assembly with said head surface facing the magnetic medium so that the magnetic head assembly is in a transducing relationship with the magnetic medium;

a motor for moving the magnetic medium; and

a processor connected to the magnetic head assembly and to the motor for exchanging signals with the magnetic head assembly and for controlling movement of the magnetic medium.

11. (Canceled)

12. (Currently Amended) A magnetic disk drive as claimed in claim [[11]] 10 wherein the second AP pinned layer is composed of cobalt iron (CoFe).

13. (Original) A magnetic disk drive as claimed in claim 12 further comprising:

a seed layer structure located between the first read gap layer and the AP pinned layer structure; and

the seed layer structure including:

a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

the first seed layer being located between the first read gap layer and the second seed layer.

14. (Original) A magnetic disk drive as claimed in claim 13 wherein the free layer structure includes a first free layer composed of cobalt iron (CoFe) and a second free layer composed of nickel iron (NiFe) with the first free layer being located between the spacer layer and the second free layer.

15. (Original) A magnetic disk drive as claimed in claim 14 wherein the spacer layer is copper (Cu).

16. (Currently Amended) A method of making a magnetic head assembly, which has a head surface for facing a magnetic medium, comprising the steps of:

forming a read head that includes a sensor;

a making of the sensor including the steps of:

forming an antiparallel (AP) pinned layer structure;

forming a ferromagnetic free layer structure that has a magnetic moment that is free to rotate in response to a field signal; and

forming a nonmagnetic electrically conductive spacer layer between the free layer structure and the AP pinned layer structure;

the forming of the antiparallel (AP) pinned layer structure including the steps of:

forming ferromagnetic first and second antiparallel (AP) pinned layers;

forming an antiparallel coupling (APC) layer between and interfacing the first and second AP pinned layers;

the first and second AP pinned layers being further formed to self pin one another without assistance of an antiferromagnetic (AFM) pinning layer;

forming the second AP pinned layer between the first AP pinned layer and the spacer layer; and

forming the first AP pinned layer of cobalt platinum chromium[[.]] $Co_{82}Pt_{10}Cr_8$.

17. (Original) A method of making a magnetic head assembly as claimed in claim 16 further comprising the steps of:

forming nonmagnetic electrically nonconductive first and second read gap layers;

forming the sensor between the first and second read gap layers;

forming ferromagnetic first and second shield layers; and

forming the first and second read gap layers between the first and second shield layers.

18. (Currently Amended) A method of making a magnetic head assembly as claimed in claim 16 wherein the free layer structure is formed between the AP pinned layer structure and [[the]] a first pole piece layer.

19. (Canceled)

20. (Currently Amended) A method of making a magnetic head assembly as claimed in claim [[19]] 16 wherein the second AP pinned layer is formed of cobalt iron (CoFe).

21. (Original) A method of making a magnetic head assembly as claimed in claim 20 further comprising the steps of:

forming a seed layer structure between the first read gap layer and the AP pinned layer structure; and

a making of the seed layer structure including the steps of:

forming a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

forming the first seed layer between the first read gap layer and the second seed layer.

22. (Original) A method of making a magnetic head assembly as claimed in claim 21 wherein the free layer structure includes a first free layer formed of cobalt iron (CoFe) and a second free layer formed of nickel iron (NiFe) with the first free layer being located between the spacer layer and the second free layer.

23. (Original) A method of making a magnetic head assembly as claimed in claim 22 wherein the spacer layer is formed of copper (Cu).

24. (New) A magnetic head assembly as claimed in claim 1 further comprising:

a seed layer structure located between the first read gap layer and the AP pinned layer structure; and

the seed layer structure including:

a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

the first seed layer being located between the first read gap layer and the second seed layer.

25. (New) A magnetic disk drive as claimed in claim 10 further comprising:

a seed layer structure located between the first read gap layer and the AP pinned layer structure; and

the seed layer structure including:

a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

the first seed layer being located between the first read gap layer and the second seed layer.

26. (New) A method of making a magnetic head assembly as claimed in claim 16 further comprising the steps of:

forming a seed layer structure between the first read gap layer and the AP pinned layer structure; and

a making of the seed layer structure including the steps of:

forming a first seed layer composed of tantalum (Ta) and a second seed layer composed of nickel iron chromium (NiFeCr); and

forming the first seed layer between the first read gap layer and the second seed layer.